



Clinical Revelations from a Research Project

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Introduction

Some research projects may not have immediate clinical applications at first sight and even when such projects aim to have a clinically relevant outcome, they can take a long time to eventuate (Contopoulos-Ioannidis et al., 2008). This is particularly obvious in translational studies where animal models are used to investigate human diseases (Pober et al., 2001; Contopoulos-Ioannidis et al., 2008; Jucker, 2010). However, the same difficulties are present for ecological projects involving species that are commonly presented for treatment at veterinary practices, e.g., zebra finches and budgerigars.

My PhD project investigating the physiology of heat stress in Australian desert birds is one such example. For one aspect of my project, zebra finches, budgerigars and diamond doves were exposed to two temperatures (35°C and 45°C) for two hours, and had blood samples collected before and after heat exposure for measurement of various haematological stress indications, e.g. serum corticosterone levels, blood cell heat shock protein 70 levels and heterophil:lymphocyte ratios. Organs (e.g., heart, lung, kidney, liver and gastrointestinal tract) were also collected at the end of the experiment for histopathological examination. I have learnt some useful lessons for my clinical work from the research project, even though the project did not aim to have clinically relevant outcomes. I have summarized these revelations below.

Smaller is not always better

27G needles are better for bleeding from the brachial vein than 30G needles even in small birds such as zebra finches. I had initially used 30G needles to bleed the first six zebra finches and budgerigars, but found that there were high incidences of haematoma formation and requirements for multiple punctures to be made for blood droplets to be of a sufficient size for collection. All these problems were alleviated simply by switching to 27G needles for the rest of the project, likely because 27G needles made a puncture hole of a sufficient size in the skin for the blood droplets to not be trapped subcutaneously to form a haematoma

Alcohol (swabs) is not always good

Swabbing the skin and feathers with alcohol over the brachial vein resulted in blood spreading out over the feathers rather than forming droplets that could be collected into haematocrit tubes via capillary action. This was likely due to the loss of down powder on the feathers which removed their waterproofing properties, allowing the blood to soak into them. This was alleviated by using water rather than alcohol for swabbing.

How hot is hot?

Budgerigars are less stressed (as indicated by blood corticosterone levels) after incubation at 35°C for two hours than before, even though this is a higher temperature than usually used in incubators for sick birds in practice. Interestingly, diamond doves appear to have a significant increase in blood corticosterone levels after exposure 45°C for two hours, even though they should have the highest physiological tolerance for heat compared to zebra finches and budgerigars (Wolf, 2015). Incubator temperatures may therefore need to be varied for different species of birds, possibly depending on the order to which they belong, but more avian species will need to be studied before more specific recommendations can be made.

References

- Contopoulos-Ioannidis, D.G., Alexiou, G.A., Gouvias, T.C., Ioannidis, J. 2008. Life cycle of translational research for medical interventions. *Science* 321, 1298-1299.
- Jucker, M. 2010. The benefits and limitations of animal models for translational research in neurodegenerative diseases. *Nature Medicine* 16, 1210-1214.
- Poher, J.S., Neuhauser, C.S., Poher, J.M. 2001. Obstacles facing translational research in academic medical centers. *The FASEB Journal* 15, 2303-2313.
- Wolf, B., A. McKechnie, A. Gerson, M. Whitfield, B. Smit, W. Talbot, J. O'Neill and T. McWhorter. 2015. Avian thermoregulation in the heat: tolerance to heat stress varies greatly among species. *The Physiologist* 58, 56.